GOVERNMENT OF INDIA
SCIENCE AND TECHNOLOGY
LOK SABHA

UNSTARRED QUESTION NO:5551
ANSWERED ON:29.04.2003
DEVELOPMENT OF BIO-TECHNOLOGY
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Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

(a) whether the development of agricultural bio-technology is likely to facilitate the study and research on agriculture - related gene in the country;

(b) if so, the details thereof; and

(c) the number of genes identified in the country so far and the number of genes on which research is being conducted at present ?

Answer

MINISTER OF STATE FOR SCIENCE AND TECHNOLOGY (SHRI BACHI SINGH RAWAT)

(a) & (b) : Yes sir, significant advances made in recent years in the area of agricultural biotechnology are going to facilitate the study and research on agriculture related genes in the country. The new tools of biotechnology have made it possible to identify, isolate and transfer gene(s) of interest into diverse crop plants across the reproductive barrier. This helps in crop improvement via molecular breeding and development of transgenic plants. Such plants with many desirable agronomic traits like pest and disease resistance, herbicide tolerance, delayed ripening, improved nutritional quality, heterosis breeding have been developed in various laboratories. Work on edible vaccines has progressed well.

(c) Nearly 22 research institutions are engaged in the development of transgenic crops through the use of identified genes. Already 27 genes specific for crop improvement have been identified. These are Bt, protease inhibitor, lectin, fatty acid desaturase, tissue specific promoter, virus resistance, protein quality and salt resistant genes. Also 24 stresses related genes have been isolated from plants of cold desert and mangrove region. Some of these genes have been transferred to commercially important crops.

The trait predominantly targeted is insect-pest resistance mainly using Bt strategy in crops like rice, cotton, tobacco, tomato, brinjal, cauliflower, cabbage, pigeonpea, sugarcane etc. For improvement of nutritional quality in potato, by over-expression of an Amaranthus protein gene AmA1, transgenic potato with balanced composition of amino acid and yield advantage is at advanced stage of field testing. In mustard, barnase and barstar genes which confer the male sterility and fertility restoration have been introduced for developing hybrid seeds. Also transgenic mustard plants have been raised with antisense genes of fatty acid desaturase 2 genes (FAD2) in low erusic acid background to reduce the levels of linolinic acid in mustard oil. Work is in progress on development of transgenic tomato rich in lycopin, enhanced post-harvest shelf life and quality, and on development of transgenic rice with high Ã¡-carotene.

Rice and wheat have been transformed with genes, which confer stress resistance. The transgenics developed are being characterized at molecular level. In addition, Indian Initiative for Rice Genome Sequencing has identified more than 2500 genes and efforts are on to demarcate agriculturally important genes whose functional analysis would be taken-up in near future.